

# Developmental Probabilistic Snow Accumulation Forecast for Denver International Airport



# Probabilistic Snow Forecast: History of the PSA product in use at WFO BOU

- *DIA Ground operations would call frequently trying to make sense of the forecast, or gather more details, not available from...*
  - *TAF, Zone forecasts, point and click map*
- *“A more probabilistic forecast of snow amounts given certain ranges of snow for staffing and equipment”*
- *DIA came up with the snowfall ranges being used.*
- *Developed by WFO BOU SOO, Dr. Eric Thaler*
- *Now in our 3<sup>rd</sup> snow season using this product.*

# Developmental Probabilistic Snow Accumulation Forecast for DIA- *INPUT*

The screenshot shows a software window titled "Probabilistic Snow Accumulation Forecast". Inside the window, there is a header bar with the text "What do you want to do?". Below this, the interface is divided into two main columns: "Short Term" and "Long Term". Each column contains two buttons: "Initialize" and "Amend", each preceded by a small diamond icon. At the bottom of the window, there are two large buttons: a green "Go" button on the left and a red "Cancel" button on the right.

- Based on input from the short term and long term forecasters.
- Initialize at 0230 and 1430 local time (times based on DIA operational needs for staffing purposes)
- Amendments are made at 0930 and 2000 local time or when changes are needed.

# Developmental Probabilistic Snow Accumulation Forecast for DIA- *INPUT*

Probabilistic Snow Accumulation Forecast Input

Short Term Discussion  
17/12Z-18/12Z

There will be a slight chance of rain showers this afternoon and a slight chance of snow showers this evening. at this time do not expect any accumulations.

17/12Z-17/18Z					
0"	1 or more"	1" or more"	3" or more"		
100	0	0	0		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		

17/18Z-18/00Z				17/12Z-18/00Z	
0"	1 or more"	1" or more"	3" or more"	6" or more"	10" or more"
80	10	0	0	0	0
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

18/00Z-18/06Z					
0"	1 or more"	1" or more"	3" or more"		
80	20	0	0		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		

18/06Z-18/12Z				18/00Z-18/12Z	
0"	1 or more"	1" or more"	3" or more"	6" or more"	10" or more"
80	10	0	0	0	0
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Long Term Discussion  
18/12Z-19/12Z

no snow is forecast in these periods.

18/12Z-18/18Z					
0"	1 or more"	1" or more"	3" or more"		
80	10	0	0		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		

18/18Z-19/00Z				18/12Z-19/00Z	
0"	1 or more"	1" or more"	3" or more"	6" or more"	10" or more"
100	0	0	0	0	0
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

19/00Z-19/06Z					
0"	1 or more"	1" or more"	3" or more"		
80	20	0	0		
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>		

19/06Z-19/12Z				19/00Z-19/12Z	
0"	1 or more"	1" or more"	3" or more"	6" or more"	10" or more"
60	40	0	0	0	0
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Output in DENWRKPSA

# Developmental Probabilistic Snow Accumulation Forecast-

## Output to WFO BOU home page at

<http://www.crh.noaa.gov/bou/?n=aviation>

The screenshot displays the NOAA website for the Denver/Boulder Office. The left sidebar contains a navigation menu with links such as 'Local forecast by City, St or Zip Code', 'XML RSS Feeds', 'Current Hazards', 'Watches/Warnings', 'Outlooks', 'Submit Report', 'Current Conditions', 'Observations', 'Radar', 'Satellite', 'Snow Cover', 'Snowfall Analysis', 'Forecasts', 'Forecast Discussion', 'Local Area', 'Activity Planner', 'Aviation Weather', 'Fire Weather', 'Marine Weather', 'Severe Weather', 'Winter Weather', 'Hurricane Center', 'Hydrology', 'Rivers & Lakes', 'Precip Estimates', 'Climate', 'Local', 'National', 'Drought', 'More...', 'Weather Safety', 'Preparedness', 'Weather Radio', 'StormReady', 'SkyWarn', 'Additional Info', 'Items of Interest', 'Education Resources', 'Coop Observer', 'Our Office', 'Contact Us', 'Contact Info', and 'Feedback'. The main content area is titled '"DENVER/BOULDER AVIATION FORECAST PRODUCTS"' and includes a search bar at the top. Below the title, it states: 'Aviation weather forecasting by the National Weather Service is in support of aircraft operations at National and International Airports as well as en-route forecasts of wind and weather. The Denver NWS Forecast Office provides forecasts for the Denver International Airport.' A 'new' icon is next to a link: 'Aviation Weather Services on the Center Weather Service Unit (CWSU) webpage (Denver-ZDV)'. The 'Terminal Aerodrome Forecasts (TAF)' section lists links for 'Denver International Airport (KDEN)', 'Rocky Mountain Metropolitan Airport (KBJC)', and 'Centennial Airport (KAPA)'. A note explains how to view the current TAF and metar observation. The 'Probabilistic Snow Accumulation Forecast' section features a 'new' icon and a link for 'Denver International Airport'. The 'Miscellaneous Forecasts' section includes links for 'Denver/Boulder Soaring Forecast' and 'Hot-Air Balloon Forecast'. The 'Colorado Upper-Air Soundings' section lists links for 'Denver (KDNR)' and 'Grand Junction (KGJT)'. At the bottom, a link for 'The Aviation Weather Center' is provided for more TAF information and forecasts.

Home Site Map News Organization Search for: NWS All NOAA Go

Local forecast by "City, St" or Zip Code  
City, St Go

XML RSS Feeds  
Current Hazards  
Watches/Warnings  
Outlooks  
Submit Report  
Current Conditions  
Observations  
Radar  
Satellite  
Snow Cover  
Snowfall Analysis  
Forecasts  
Forecast Discussion  
Local Area  
Activity Planner  
Aviation Weather  
Fire Weather  
Marine Weather  
Severe Weather  
Winter Weather  
Hurricane Center  
Hydrology  
Rivers & Lakes  
Precip Estimates  
Climate  
Local  
National  
Drought  
More...  
Weather Safety  
Preparedness  
Weather Radio  
StormReady  
SkyWarn  
Additional Info  
Items of Interest  
Education Resources  
Coop Observer  
Our Office  
Contact Us  
Contact Info  
Feedback

### "DENVER/BOULDER AVIATION FORECAST PRODUCTS"

Aviation weather forecasting by the National Weather Service is in support of aircraft operations at National and International Airports as well as en-route forecasts of wind and weather.

The Denver NWS Forecast Office provides forecasts for the Denver International Airport.

[Aviation Weather Services on the Center Weather Service Unit \(CWSU\) webpage \(Denver-ZDV\)](#)

#### Terminal Aerodrome Forecasts (TAF)

► [Denver International Airport \(KDEN\)](#)

► [Rocky Mountain Metropolitan Airport \(KBJC\)](#) ► [Centennial Airport \(KAPA\)](#)

Note: If you want to see the current TAF along with the metar observation, click on the [Aviation Page link](#) and when you arrive at the Aviation page, just type in the 4 letter identifier and click on get TAFs and METARs:

#### Probabilistic Snow Accumulation Forecast

► [Denver International Airport](#)

#### Miscellaneous Forecasts

► [Denver/Boulder Soaring Forecast](#) ► [Hot-Air Balloon Forecast](#)

#### Colorado Upper-Air Soundings

► [Denver \(KDNR\)](#) ► [Grand Junction \(KGJT\)](#)

► [The Aviation Weather Center](#)  
(For more TAF information and forecasts)



# Developmental Probabilistic Snow Accumulation Forecast *Output*

Developmental Probabilistic Snow Accumulation Forecast  
National Weather Service Denver/Boulder, Colorado  
0303 MST Monday January 10, 2011

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This developmental product contains the probabilities (%) that the given snow amounts (inches) will occur at Denver International Airport during the respective 6- or 12-hour periods. The probabilities indicate the amount of snow that will fall from the clouds. They do not consider the amount of melting that may or may not occur on various ground surfaces. [T (trace) means more than zero.]  
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Short Term Discussion (10/12Z-11/12Z): Snowfall will gradually diminish this morning but minor accumulations are still expected through mid to late morning. Additional accumulation is expected to be around an inch. A few flurries still possible this afternoon but little or no accumulation.

Day/Hour GMT	0"	T or more	1" or more	3" or more	6" or more	10" or more
10/12-10/18	0	100	20	0		
10/18-11/00	60	40	0	0		
10/12-11/00					0	0
11/00-11/06	100	0	0	0		
11/06-11/12	100	0	0	0		
11/00-11/12					0	0

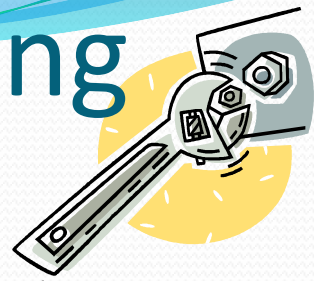
Long Term Discussion (11/12Z-12/12Z): No snow is expected during the period.

Day/Hour GMT	0"	T or more	1" or more	3" or more	6" or more	10" or more
11/12-11/18	100	0	0	0		
11/18-12/00	100	0	0	0		
11/12-12/00					0	0
12/00-12/06	100	0	0	0		
12/06-12/12	100	0	0	0		
12/00-12/12					0	0

Deterministic Forecast for Denver International Airport  
515 AM MST Monday January 10, 2011

Valid at MM/DD:UT	Sky %	PoP %	CWR %	AT F	Td F	RH %	Wind(mph) Dir Sp Gs	QPF inch	Snow inch	Tx RHn F %	Tn RHx F %
01/10:12	98	60	38	6	3	86	N 12 16	----	---		
01/10:13	96	60	38	7	3	84	N 10 12				
01/10:14	96	60	38	7	3	84	N 9				6 100
01/10:15	95	60	38	6	3	87	NNE 8 10	0.03	0.6		
01/10:16	95	60	38	10	4	77	NNE 9				
01/10:17	93	60	38	12	5	73	NNE 10				
01/10:18	93	20	4	14	6	69	NNE 12 17	----	---		
01/10:19	83	20	4	14	6	68	NNE 12				
01/10:20	83	20	4	12	5	73	NE 9				
01/10:21	77	20	4	14	5	66	NE 8 8	0.01	0.2		
01/10:22	77	20	4	13	4	66	ENE 7				
01/10:23	77	20	4	12	3	67	E 5			14	64
01/11:00	58	5	1	10	2	69	E 3 3	----	---		
01/11:01	58	5	1	9	1	68	ESE 3				
01/11:02	58	5	1	8	-1	66	ESE 3				
01/11:03	58	5	1	6	-3	65	SE 3 3	0.00	0.0		
01/11:04	58	5	1	5	-4	64	SSE 3				
01/11:05	58	5	1	4	-6	64	S 3				
01/11:06	15	0	0	3	-7	63	SSW 5 5	----	---		
01/11:07	15	0	0	2	-8	65	SSW 5				
01/11:08	15	0	0	2	-8	62	SSW 6				
01/11:09	17	0	0	0	-9	65	SW 8 8	0.00	0.0		
01/11:10	17	0	0	1	-10	59	SW 12				
01/11:11	17	0	0	4	-11	48	SW 16				
01/11:12	18	0	0	4	-12	48	SW 18 28	----	---		
01/11:13	18	0	0	4	-10	51	SSW 17				
01/11:14	18	0	0	1	-8	66	SSW 15				-5 93
01/11:15	18	0	0	-4	-5	93	S 10 16	0.00	0.0		
01/11:16	18	0	0	6	-4	65	S 9				
01/11:17	18	0	0	12	-2	54	SSW 8				
01/11:18	33	0	0	18	0	45	SSW 8 8	----	---		
01/11:19	33	0	0	19	1	46	S 6				
01/11:20	33	0	0	18	2	49	SSE 5				
01/11:21	33	0	0	19	2	49	SSE 3 3	0.00	0.0		
01/11:22	33	0	0	19	2	48	SE 3				
01/11:23	33	0	0	18	1	48	SE 5				19 44
01/12:00	40	0	0	13	1	57	ESE 6 6	----	---		
01/12:01	40	0	0	11	0	61	SE 6				
01/12:02	40	0	0	10	-1	61	S 7				
01/12:03	40	0	0	9	-2	61	SSW 7 7	0.00	0.0		
01/12:04	40	0	0	8	-2	62	SSW 7				
01/12:05	40	0	0	8	-2	62	SW 7				
01/12:06	40	0	0	6	-2	69	SW 8 8	----	---		
01/12:07	40	0	0	7	-2	68	SW 8				

# The Nuts and Bolts of the Thing



- 25 grid points used around DIA, spaced using 40km resolution between grid points.
- SREF data using temperature, QPF, and thickness at the surrounding points.
- Computes the snow to liquid based on elevation and 1000/500mb thickness at each point at 3 different time periods.
- How many times was the snow threshold met at each grid point and then divide by 75. (total grid points around DIA and through time to get the probability)

# Developmental Probabilistic Snow Accumulation Forecast

## Questions?

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